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Sunday, May 23, 2004

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Mr. Thomas Grim, Document Manager
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RE: Draft LLNL SW/SPEIS

Dear Mr. Grim:

1/31.06

Thank you for this opportunity to comment on the LLNL SW/SPEIS. First I must comment on the size of this 3,000+ page document. Under the CEQ regulation, found at 40 CFR 1502.7, it states "(T)he text of final environmental impact statements...shall normally be less than 150 pages and for proposals of unusual scope or complexity shall normally be less than 300 pages." Since enforcement is a non-issue I expect this to be, blatantly, violated.

Much of the key data that is essential to this draft SW/SPEIS resides solely in the massive collection of twelve appendixes. The Table of Contents (ToC) in the draft Volume I SW/SPEIS and its Summary booklet failed to list any appendices. The ToC in the final version of both books should list all appendices, including their titles. Those who receive just the Summary booklet, such as the public's elected representatives, deserve to know how much they are missing.

Volume III
Appendix M - Use of Proposed Material on the National Ignition Facility
M.3.1 - No Action Alternative
(M-12, PDF page 446 of 643) (2nd paragraph)

2/26.05

"The manner of operation of the NIF laser and target area building and the laser system would be the same for all of the alternatives and will not be repeated in the Proposed Action and the Reduced Operation Alternative sections."

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2/26.05 cont.

The Proposed Action will require fundamental design changes to the existing target chamber and will require the design and construction of expensive insertable target chambers, external to the chamber, in the target area building. Details of these design changes should have been presented in the draft SW/SPEIS. They were not. The reconfiguration work of the target chamber will require major changes in operation. In the final LLNL SW/SPEIS the Proposed Action description sections should be completely separated from the No Action and the Reduced Operation Alternative sections.

M.3.1.1 - National Ignitions Facility Operations Facility Utility Usage
(M-13, PDF page 447 of 643) (1st paragraph)

3/26.05

The list of utilities should include the high vacuum system.

M.3.1.2 - Laser Operation
(M-13, PDF page 447 of 643) (bullet list)

Include another bullet item under the Annual total yield of 1,200 megajoules per year. The new bullet item should provide the total energy usage of the facility of approximately 500,000 megajoules per year.

M.3.2 - Proposed Action
(M-19, PDF page 453 of 643) (1st paragraph, 2nd half)

4/26.03

More details should be provided about the "other fissile materials" category so the public can determine whether or not LLNL's environmental impact analysis is accurate.

Also, more details should be provided concerning the phrase "specially prepared plutonium."
If these issues remain classified the SW/SPEIS should clearly state that that is the case, and should specify the specific classification categories, such as Secret, Restricted Data.

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5/26.03 M.3.2 - Proposed Action
(M-20, PDF page 454 of 643) (2nd to the last sentence)

There would be major differences.

M.3.2.1. - National Ignition facility Experiments
(M-20, PDF page 454 of 643) (middle of 2nd paragraph)

"These materials would use the same target positioner..."

If the final designs of the target positioner and the inner containment chamber are not yet known then the above, quoted, statement is premature. Questions still need to be answered about how the target positioner will enter the sealed inner containment chamber without altering the primary target positioner.

Experiments with Plutonium
(M-20, PDF page 454 of 643) (2nd paragraph, last line)

"Other systems, such as...the liquid helium transfer system, could require modification."

6/26.05 This statement appears to conflict with the previous quoted statement which indicated that the positioner would not change. The liquid helium transfer system and positioner are tightly integrated components.

Experiments with Plutonium
(M-20, PDF page 454 of 643) (1st paragraph, last sentence)

The placement of the large target chamber port at the equator or through the bottom involves a major decision. Once that decision is made the actual modification will cost a great deal and will seriously disrupt operations. The public review of the LLNL SW/SPEIS should not proceed until the final design of the insertion port, the inner containment chamber and the target positioner/liquid helium transfer system are completed.

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Experiments with Plutonium
(M-21, PDF page 455 of 643) (4th paragraph, middle)

"Personnel at the NIF would not be exposed to the materials inside the inner containment vessel."

7/26.05 This statement fails to address the fact that the outside of the inner containment vessel will become contaminated from the debris contained in the outer containment chamber. If the experiment causes x-ray ablation of contaminated inner surfaces of the outer chamber then this material will deposit on the inner chambers outer surfaces. The external surfaces, of the inner chamber, will be contaminated by other process while it is sealed in the inner chamber. The SW/SPEIS needs to address more details about the insertion and extraction processes, such as will this involve a decontamination of the insertion port, the outer surface of the inner chamber and a decontamination of the outer chamber's inner surface.

Experiments with Plutonium
(M-21, PDF page 455 of 643) (5th paragraph, middle)

8/26.05 More details should be provided concerning this "special glovebox" Such details should not be left out for reasons of classification. In short, SW/SPEIS should not proceed until the numerous conceptual plans have reached a stage of advanced design and planning.

Experiments Without Inner Containment Vessel
(M-22, PDF page 456 of 643) (1st paragraph, 2nd half)

9/26.03 Although, "...many of the isotopes have short half-lives..." many others have long half-lives. Full public accountability should involve an admission that a substantial fraction of the mass of the radioisotopes, that will remain in the chambers during clean-out time, will involve isotopes with half-lives in excess of one month.

The statement that many of the isotopes "...are short-lived and would decay..." appears often. Each time it appears it should be balanced with a statement that many others are long-lived.

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Experiments Without Inner Containment Vessel
(M-22, PDF page 456 of 643) (Table M.3.2.1-1.--National Ignition Facility Inventories for Proposed Materials)

10/26.03 There should be two data columns. One should be the Maximum Inventory mass in grams. The other should be a column that gives the Maximum Inventory activity quantity in curies.

Experiments Without Inner Containment Vessel
(M-23, PDF page 457 of 643) (3rd paragraph)

Some isotopes are expected to be held on the liquid nitrogen cooled cryopumps while they decay. The SW/SPEIS should describe the relative effectiveness of liquid nitrogen cooled cryopumps vs. liquid helium cooled cryopumps and why the far less effective liquid nitrogen cooling is planned be used. A description is needed that explains what happens when the cryopump looses its coolant flow. The analysis should include an accident scenario where the cryopumps loose their coolant for an extended period of time.

11/26.03 Also mentioned here is an accumulation tank. More description of this tank and its intake and discharge systems is needed. Substitute the word "most" with a quantitative value. Also include the number of isotopes that have half-lives of greater than one month. If the cesium-137 and strontium-90 are to be held until they decay explain that the hold period will have to be about 600 years.

"Fission products that are solids (very small amounts) would be retained in the target chamber."

Substitute the phrase "very small amounts" with a specific estimated quantity, measured in grams and in curies at cleanout time.

In the last sentence remove the word "any" since minimizing does not mean eliminating.

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Personnel Exposure
(M-23, PDF page 457 of 643) (1st paragraph, last line)

"This would not change from the No Action Alternative."

7/26.05 cont. The removal of the inner containment vessel would involve additional, non-routine, decontamination operations in the target building and, after transport, in the Tritium Facility. This, could, easily, result in additional personnel exposures at both facilities. The combined effect should be addressed in the NIF appendix of the SW/SPEIS. Explain how administrative controls could involve increasing the number of personnel exposed so as to keep an individuals personal dose within required limits.

Section M.3.2.1, may require another subsection title that reads "Experiments With Inner Containment Vessel."

M.3.2.3 - Waste Generated During National Ignition Facility Operations
(M-23, PDF page 457 of 643) (1st paragraph, 2nd sentence)

"Because fission products could be produced from some yield experiments, it is expected that there would be a small increase in LLW related to filters."

12/26.06 Replace the word "could" with the word "would." Under the Proposed Alternative, many yield experiments would involve fissionable materials to produce a fissile yield. By definition, the yield process always produces fission products. If the word "could" is retained, then LLNL SW/SPEIS editors should explain how that retention serves the public good. Also, quantify the word "small" by adding a percentage increase figure for both curie quantity and radioisotopic mass.

(M-23, PDF page 457 of 643) (2nd paragraph, middle)

13/26.07 In addition, to the total volume of the inner containment vessel, specify the inner diameter of the insertion port that will be required. The additional waste stream, that would be added to the Tritium Facility (Building 331), should be fully accounted for in the NIF appendix of the LLNL SW/SPEIS. This waste stream constitutes a cumulative impact of the NIF project and, therefore, all its components should be presented in the NIF Appendix.

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M.3.2.4 - Neutron Spectrometer
(M-24, PDF page 458 of 643) (2nd paragraph, middle)

"The neutron spectrometer construction would not start before fiscal FY2008 and when completed would become part of the NIF operational facility."

14/26.06 All design, construction, and instrument costs, associated with the neutron spectrometer, should be fully accounted for as a component of the NIF facility. Once the decision is made to begin construction, its estimated operating costs should be projected into the future operating cost of the NIF.

M.3.2.4 - Neutron Spectrometer
(M-24, PDF page 458 of 643) (2nd paragraph, middle)

M.5 - Environmental Consequences
M.5.2 - No Action Alternative
M.5.2.13 - Materials and Waste Management
M.5.2.13.1 - Radionuclide Materials Management
(M-49, PDF page 483 of 643) (1st three paragraphs)

The first three paragraphs read as follows.

15/26.05 "Under the No Action Alternative, the NIF would use targets that could contain radioactive materials, including depleted uranium and tritium. The amount of material would vary according to each test.

During the NIF yield experiments, all materials in the target bay would be subject to neutron activation. This would include the target chamber walls, vacuum systems, air handling systems, equipment, shielding, filters, facility walls, roof and floors, room air, and support structures including optics and beam lines. Any particulates, adherent material, and target debris left in the target chamber from previous experiments could, in turn, be exposed to neutrons, energetic particles, debris, and x-rays from subsequent experiments. Neutron exposure from yield experiments would result in some of the material and debris from the previous experiment becoming activated. The particulates would accumulate in the target chamber until the scheduled annual cleanup.

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Exposure to the particulate prior to annual cleanup would be managed to minimize exposure. The radioactive particulates created in the target chamber would be transferred to the decontamination systems and waste streams during cleanup. However, because these are mostly short-lived species, the maximum inventories would be found in the target chamber shortly after the last experiment and well before cleanup. By the time cleaning occurs or components are removed, the radioactive particulate inventory would have decayed to much smaller quantities.

Table M.5.2.13.1-1 lists the prominent radionuclides expected to result from neutron exposure of particulates in the target chamber. The total inventory of activated, mobilizable particulates created in the target chamber would be quite small, but it is included here for completeness. The inventories in Table M.5.2.13.1-1 would be maximum inventories. They would correspond to a final 45-megajoule experiment (maximum credible yield), ending one year of experiments with 1,200 megajoules total yield. The 45-megajoule inventories are used here to bound inventories of activated material."

15/26.05 cont.

I found many distortions, errors and omissions in them. They should be changed to read as follows.

Under the No Action Alternative, the NIF would use targets that would contain radioactive materials, including depleted uranium and tritium. The amount of material would vary according to each test.

During the NIF yield experiments, all materials in the target bay would be subject to neutron activation. This would include the target chamber walls, vacuum systems, air handling systems, equipment, shielding, filters, facility walls, roof and floors, room air, and support structures including optics and beam lines. Any particulates, adherent material, and target debris left in the target chamber from previous experiments would, in turn, be exposed to neutrons, energetic particles, debris, and x-rays from subsequent experiments. Neutron exposure from yield experiments would result in some of the material and debris from previous experiments becoming radioactively activated. The particulates would accumulate in the target chamber until the scheduled

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annual cleanup. Exposure to the particulates prior to annual cleanup would be managed by interim cleanups and other actions to minimize exposure. Most radioactive particulates created in the target chamber would be transferred to the decontamination systems and waste streams during cleanup. However, because many of the activation products, in the particulates, are short-lived species, the maximum radioactivity inventories would be found in the target chamber shortly after the last experiment and well before cleanup. By the time cleaning occurs the particulate radioactivity inventory will have decayed to much smaller levels.

Table M.5.2.13.1-1 lists the prominent radionuclides expected to result from neutron exposure of particulates in the target chamber. The total radioactivity quantity inventory of activated, mobilizable particulates remaining in the target chamber would be small, relative to the total value of all the induced and debris radioactivity, but it is included here for completeness. The inventories in Table M.5.2.13.1-1 would be maximum radioactivity quantity inventories. They would
15/26.05 cont. correspond to a final 45-megajoule experiment (maximum credible yield), ending one year of experiments with 1,200 megajoules total yield. The 45-megajoule inventories are used here to bound radioactive inventories of only the activated particulate material. The table excludes tritium activity, non-particulate activity, plutonium isotope activity and fission product activities.

The draft LLNL SW/SPEIS focus on mobilizable particulates ignores the contribution of many other radioactive sources. These include non-mobile radioactive particulates, radioactive materials fused onto chamber and internal equipment surfaces, radioisotopes driven into surface pores, and radioactive gases, such as tritium, that diffuse into bulk metal components throughout the chamber and vacuum system. The all revisions of the SW/SPEIS should devote far more attention to these issues before a final environmental analysis is made.

Exposure management will require interim cleanup actions and rotating personnel to minimize individual doses, as well as to limit the dispersal of contamination. It is deceptive to suggest that the "scheduled annual cleanup"

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15/26.05 cont. is the only cleanup action that this SW/SPEIS needs to address.

M.5.2.13.1 - Radionuclide Materials Management
Depleted Uranium
(M-49, PDF page 483 of 643) (bottom paragraph)

The third sentence reads:

"Depleted uranium would be used only in nonyield experiments and would not be considered "activated," and no fission products would be produced."

Accuracy demands that it should read:

Depleted uranium would be used only in minor yield experiments and, due to neutron activation the debris that results would contain plutonium isotopes and fission products.

Continuing to not consider these results constitutes a major violation of public trust and may involve a violation of existing law. A portion of the U-235, in the depleted uranium (DU), would fission producing a tiny fission yield and fission products such as Cs-137. Some of the U-238 isotope, that constitute the bulk of
16/26.03 the DU, would be transmuted to various plutonium isotopes which will be present in the blast debris. This is basic physics that can not be hidden by clever technical writers. These are issues which the LLNL SW/SPEIS must address in all future public revisions as well as in the Record of Decision (ROD).

If the term "nonyield" is retained then add this term to the Glossary, Chapter 11 in Volume I. It should be defined by a specific threshold of fission yield, as defined by the production of a specific flux of prompt fission neutrons. The term, and definition, should be supported by specific references in public scientific literature.

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M.5.2.13.1 - Radionuclide Materials Management
(M-50, PDF page 484 of 643)
(Table M.5.2.13.1.--Bounding Annual Radionuclide Particulate Inventories in the Target Chamber
(No Action Alternative)

17/26.05 The heading of this table should be changed to reflect the limited scope of isotopes shown. This table is, primarily limited to neutron activation products in the small quantity of particulates. Missing, is trapped tritium which could contribute a level of radioactivity in excess of all the figures shown in this table. Also missing is the fission products, such as cesium-137 and strontium-90, that will result from use of DU. Another result of DU use will be plutonium production. This will be a component of the blast debris and must be accounted for in the publicly distributed LLNL SW/SPEIS. Finally, two additional columns should appear on this, and most other, tables that list specific isotope radioactivity quantities in the engineering units of the Curie. One column should provide the mass, in grams, of each of the respective isotopes. Another column should provide the half-lives of the isotopes in units of days. If this table was derived through an unscientific extraction of selected data from a more comprehensive table that is classified secret, then that fact should appear in the table's footnotes. After the missing data is exposed another environmental impact analysis should be performed.

M.5.2.13.1 - Radionuclide Materials Management
Tritium
(M-49, PDF page 483 of 643) (1st paragraph)

18/26.04 This paragraph reads as follows:

"Tritium would arrive at the facility in individual targets, containing up to 5 curies each: 2 curies in the capsule and up to 3 curies in the associated hardware. If direct drive were implemented, each target would contain up to 70 curies. The maximum annual tritium throughput at the NIF would be limited to 1,750 curies per year. The in-process inventory limit for tritium for the NIF would total no more than 500 curies at any time."

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If planned NIF target capsule filling operations have shifted from sites external to LLNL to a facility at the lab, then the facility should be identified in the SW/SPEIS. That facility could handle tritium quantities which are in excess of the NIF input quantities listed above. The NIF impact analysis should incorporate any and all impacts associated with any "on campus" target fabrication facilities which may be involved with fabricating target capsules of up to 70 curies of tritium.

18/26.04 cont. Taking into consideration that target capsules may contain up to 70 curies and that the maximum annual tritium throughput at the NIF could extend up to 1,750 curies per year, the estimate, of 30 curies of tritium that could be released during maintenance, may need an upward revision.
Note: The 30 curie value, shown with Table M.5.2.8-3.--Annual Routine Radiological Emissions from the National Ignition Facility (No Action Alternative), is approximately 7,000 times the value shown for activated air production and emissions. The environmental impact analysis should be based upon annual tritium emissions of at least 100 curies.
(Table M.5.2.8-3 is at M-44, PDF page 478 of 643)

M.5.2.13.1 - Radionuclide Materials Management
Tritium
(M-49, PDF page 483 of 643) (bottom paragraph which continues to the top of the next page)

This paragraph reads as follows:

19/26.04 "Items exposed to tritium are subject to tritium contamination. After an experiment, unburned tritium would be exhausted from the target chamber to the vacuum system and then processed and retained in the tritium collection system. Residual tritium on the first wall surface and on components would be removed during the decontamination process. This would transfer a small amount of tritium to the waste stream. The emissions of tritium are addressed in Section M.5.2.8.4."

It should state something like:

Items exposed to tritium usually are contaminated by

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it. After an experiment, a portion of the unburned tritium would be exhausted from the target chamber to the vacuum system and then processed and retained in the tritium collection system. Residual tritium on the first wall surfaces and on internal component surfaces would be, largely, removed during the decontamination process. This would transfer some of the tritium blast debris to the waste stream. The emissions of tritium are not addressed at the end of Section M.5.2.8 - Air Quality, where Table M.5.2.8-4.--Radiological Impacts to the General Public from Airborne Effluent Emissions during Normal Operation (No Action Alternative) appears.

19/26.04 cont.

The document writers should supply many missing details. For example, they should state that nearly all the targeted tritium will end up either in the waste stream, as a bulk contaminate of various components such as the NIF chamber and vacuum system, or will be exhausted to the atmosphere. A revised draft SW/SPEIS should provide details of the "tritium collection system."

The first wall panels do not prevent tritium from getting behind them where it will contaminate the rear surfaces of the panels and the inner surfaces of the target chamber. Of course, tritium diffusion will also result in bulk contamination of the target chamber's metal components. Since removal of the first wall panels is only planned for every eight years, tritium contamination will build up over time. The annual attempts to clean all chamber surfaces could prove quit difficult, if not impossible. One result may be that the first wall panel replacement schedule could drop to annually, increasing down-time, increasing NIF operating cost and significantly increasing the volume and mass of the radioactive solid LLW that could be generated.

20/26.06

Section M.5.2.8.4 does not exist as a separate heading in this NIF Appendix N. This should be properly addressed so that a search for the referenced data does not lead to a unrelated topic and data. Radiological impacts on remote, downwind, humans is only partly related to the specific tritium emissions from the NIF facility.

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M.5.2.13.3.1 - Radioactive and Mixed Waste
Waste Oils and Associated Equipment
(M-56, PDF page 490 of 643) (single paragraph)

21/26.05

The suggestion is made that the oil-free pumps could be used and that would, largely, eliminate the 0.2 cubic meters per year of mixed liquid oil waste (radioactive MLLW). This was based upon a 1998 plan (LLNL 1998h). Six years have elapsed since then and the draft SW/SPEIS states that there is still some uncertainty about the technology and the resulting vacuum pump oil volume. By now the purchase decision may have already been made and the pumps may even be in place. There should be little uncertainty remaining. There is no longer a place for idle speculations. Another issue that should be seriously addressed is accountability for underestimating the waste stream volume and radioactivity content. Tritium, fission product, and plutonium contamination may be greater than previously estimated. As a result, several sections of Appendix N and Volume I may need major revisions before a final LLNL SW/SPEIS is issued.

M.5.3 - Proposed Action
(M-60, PDF page 494 of 643) (1st paragraph)

4/26.03 cont.

The first sentence needs to be completely rewritten by someone with a better understanding of the list of fissile materials that are proposed to be employed. Many of the terms are redundant or repeated. Perhaps a PhD physicist who's known to be good at communicating with the public could be employed for this task.

The last two sentences should provide more details. For example the term "small" should be defined in terms of the maximum mass and radioactive quantity for experiments that avoid the use of a inner containment vessel. Also, the phrase "specially prepared" requires more explanation. If this is classified information, a legal basis should be cited. The final sentence states that the sealed inner containment vessel is intended to protect the target chamber. Finish this paragraph with a sentence like: The inner containment vessel is intended to protect the target chamber the first wall panels and the vacuum system from contamination by the increased quantities of plutonium and fission products that would be produced under the Proposed Action plan.

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M.5.3 - Proposed Action
(M-60, PDF page 494 of 643) (2nd paragraph, middle)

22/26.03 If other highly radioactive actinides are used the new environmental impacts are supposed to remain within the existing bounds. This can't be evaluated by the public since so little information has been provided on this topic and since it appears the existing analysis is, seriously, flawed.

M.5.3.8 - Air Quality
M.5.3.8.4 - Radiological Air Quality
(M-64, PDF page 498 of 643) (2nd paragraph, 2nd half)

23/26.03 Transporting NIF radioactive effluents to the LLNL Tritium Facility and then releasing them there appears to be something of a shell game. If these effluent releases are not accounted for as part of the NIF project then this constitutes a violation of the spirit, if not the letter of the NEPA law. Any revisions of the LLNL SW/SPEIS should include the NIF experiment radioactive product releases, at the Tritium Facility, as part of the NIF SPEIS.

M.5.3.8.4 - Radiological Air Quality
(M-64, PDF page 498 of 643) (3rd paragraph)
(This is followed Table M.5.3.8.4-1 on the following page)

The first sentence reads:

24/26.03 "The fission product inventories created in the target chamber from plutonium experiment neutron activation would be bounded by the highly enriched uranium fission products routinely released and listed in Table M.5.3.8.4-1."

The above sentence needs to be rewritten so it makes more sense. Fission products, are not produced by the process that is commonly referred to as neutron activation. Apparently, LLNL's contract writers have little familiarity with this subject and LLNL's SW/SPEIS review oversight process is not up to the task of catching such fundamental errors.

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24/26.03 cont. The term bounded is a vague way of saying is greater than. It detracts from the public's understanding of the issue. The radioactive quantity of fission products, produced by a speculated 60, high yield, U-235 fission experiments per year is bound to exceed the production of fission products from far fewer, very expensive, Pu-239 experiments per year. The suggestion that the annual plutonium fission product production inventory is less than the annual air effluents release inventory for the uranium fission products, is worse than trying to compare apples and oranges. The public can not evaluate this for several reasons. One reason is that hard data, on the proposed plutonium experiments, is largely absent. Another reason is that trying to compare this with the U-235 fission data is meaningless considering that the isotopes, presented in Table M.5.3.8.4-1, are only a carefully selected subset of a much larger group of fission products. It appears that most of the iodine isotopes are shown because charcoal beds are highly effective in trapping it. This presentation shows a large reduction in this element due to the use of a charcoal bed. Numerous isotopes may be listed in the table to add fluff. These are short-lived isotopes which show a zero for their quantity. A third reason is that many plutonium fission yield experiments will be conducted within an inner containment vessel which will be transported to the Tritium Facility where the experiment products will sealed for shipment to the Nevada Test Site for burial and where a tiny fraction may escape to the local atmosphere. Releases here are not treated as a component of the experiment releases at the NIF site.

25/26.05 Table M.5.3.8.4-1 should include a third column containing the half-lives of the listed elements. Another footnote should be added that specifies that the table is based upon equally spaced experiments, beginning one year before the derived integrated values.

M.5.3.8.4 - Radiological Air Quality
(M-64, PDF page 498 of 643)
(4thd paragraph, last sentence)

26/26.06 This sentence should be removed or should reflect the contents of table footnote b. Apparently, data was removed from this table prior to presentation to the

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public.

M.5.3.13 - Materials and Waste Management
(M-68, PDF page 502 of 643) (2nd paragraph)

Add to this paragraph the following sentence.

Change the first sentence to read - Particulates would be generated in the target chamber or in the inner containment vessel from each experiment.

Then follow with a few new additional sentences that read -

27/26.03 In addition to mobile particulates, there will be non-mobile particulates, particles fused to chamber and window surfaces, as well as particles buried in pits and cracks. Blast debris gases will diffuse throughout the large chamber and vacuum system. Radioactive tritium will diffuse deep into the bodies of all these systems, as well as into the target positioner metals and other instruments located in the target chamber. In the case of experiments conducted with the an inner containment vessel, the single experiment blast debris is likely to remain in the vessel but its outer surface may become contaminated due to contaminates that remain in the main target chamber. In addition to the blast debris gases and solids, the high flux of neutrons will generate radioactive activation products in many materials and gases found throughout the target bay area.

28/26.03 Section M.5.3.13.1 needs to be greatly expanded to account for all these forms of radioactivity in the NIF target bay area and in the LLNL Tritium Facility glove box room where the sealed inner containment vessels will be breached.

M.5.3.13 - Materials and Waste Management
M.5.3.13.1 - Radionuclide Materials Management
(M-68, PDF page 502 of 643) (1st paragraph, middle)

29/26.06 Remove either the phrase "fissile materials" or "fissionable" materials. They are redundant and suggest the contract technical writers don't understand the topics they are writing about. If they are not redundant then add the phrase fissionable to the Glossary in Volume I. Also, expand the list of "Fissile" materials under

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that phrase in the Glossary.

29/26.06 cont. In the last sentence make the term "wall" plural since the chamber contains many wall surfaces, including the first wall panels. Also, mention that the tritium will result in bulk contamination of the chamber vacuum system. Replace the word "onto" with the word "into."

M.5.3.13.1 - Radionuclide Materials Management
(M-68, PDF page 502 of 643) (2nd paragraph, 2nd half)
(referenced to Table M.5.3.13.1-1 on paper page M-70, PDF 504 of 643)

The last two sentences should be rewritten to reflect the data this table actually contains. It only contains listings of the radioactivity quantity for the fission source materials that will, primarily, wind up in particulates in the target chamber or in the inner containment vessel. The last sentence states these values involve an accumulated total for a full year of operation. The figures for the uranium experiments do reflect the quantities of uranium used. The figures for the plutonium experiments reflect the use of these materials for a single experiment.

30/26.03 At the bottom of the table is a mass figure for the inner containment vessel particulates. This item is not described in the notes and it may have been added later. It appears to be unrelated to the mass of plutonium used and may simply represent the estimated radioactive blast debris resulting from a single experiment in an inner containment vessel. I could also represent the total debris that might result from one year of testing using the inner containment vessel. The source of the 225 gram figure needs to be explained, considering that the target fuel mass per shot is from 1 to 3 grams.

The mass figure for the accumulated total particulates in the target chamber is not provided in this table. It should be. Its value could be over a kilogram. This should then be contrasted with the LLNL SW/SPEIS statement saying that the particulate debris inventory would be quite small.

The title of Table M.5.3.13.1. should be changed to reflect the limited data it contains. Readability would be improved by some reformatting to separate the Highly

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enriched uranium heading from the bottom of the Depleted Uranium section. The inner containment vessel plutonium experiment sections should be clearly labeled as single experiment values and not annual integrated values. The total mass of all blast debris particulates generated after a first year of 1,200-MJ operation should be provided for inner containment vessel and for the target chamber. Finally, another column should be provided that list the, corresponding mass, in grams, of each of the isotope curie values.

30/26.03 cont.

Alternately, the table should be expanded to reflect the details that the title suggests. This would involve listing at least seventeen fission product isotopes, including cesium-137, strontium-90, krypton-85, antimony-125, promethium-147, europium-155, ruthenium-106, cerium-144, tin-123, tellurium-127m, zirconium-95, yttrium-91, strontium-89, cadmium-115m, ruthenium-103, tellurium-129m, and cerium-141. These are not the short-lived isotopes the NIF promoters feel driven to frequently mention in this environmental impact statement. The shortest lived isotope, in my list, has a half-life of 32 days.

The table should also list tritium as a particulate contaminate and it should provide a representative sampling of at least eleven neutron activation products such as beryllium-7, chromium-55, iron-55, iron-59, nickel-63, nickel-59, nickel-65, copper-64, molybdenum-93, niobium-98, and gold-198. The activation products that will result from the lengthy list of tracers, found in the table footnotes, should be mentioned.

31/26.03

At the end of footnote "a" of Table M.5.3.13.1-1 is the following statement.

"Trace quantities of solid fission products would also be produced; they are not included here because of their very small impact."

The next LLNL SW/SPEIS that is issued should prove the validity of this statement by exposing the isotopes, that I have just listed. The name of the person who made this decision should be included under such statements. If this data has been withheld because it is considered classified data, then a legal citation should be provided that specifically exempts this information from being

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31/26.03 cont.

made public. The public must be provided with a full set of data so that they can determine if the internal analysis was accurate and done properly.

This table and some of the following isotope tables appear to represent a classic case of the lab pulling the wool over the eyes of the public. Table M.5.3.13.1-1 only provides some starting point data, upon which the environmental impact was calculated. No clues are given concerning the internal lab decisions that finally led to the conclusions that the public impacts would be minimal. The cultural system that has driven this analytical process must change.

32/26.06

M.5.3.13.1 - Radionuclide Materials Management (M-68, PDF page 502 of 643) (3rd paragraph, 2nd half) (referenced to Table M.5.3.13.1-2 on paper page M-73, PDF 507 of 643)

The first sentence reads-

Particulates created in the target chamber would see neutrons from yield experiments and be subject to neutron activation.

It should read-

Particulates resulting from target explosions and other highly energetic processes would be irradiated by neutrons from yield experiments which would result the generation of neutron activation products that are often radioactive.

The second sentence reads-

Fissile and fissionable isotopes would also be subject to fission.

It should read-

Fissionable isotopes, contained in particulate particles could fission upon exposure to the neutrons of following yield experiments.

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Table M.5.3.13.1-2. lists the prominent nuclides expected to result from neutron exposure of target materials in the target chamber.

To more accurately reflect what is contained in this highly deficient table, it should read-

Table M.5.3.13.1-2 lists seven carefully selected small subsets of radioactive nuclides expected to remain or result from neutron exposure of target materials in the target chamber and in the inner containment vessels.

33/26.05 The radioactivity values, for experiments conducted without the inner containment vessel, are based upon the end of the first year run with 60 experiments at 20 MJ each which ends with a 45-MJ fusion yield experiment. The values, for an experiment conducted with the inner containment vessel, are based upon a single experiment using 1.0 g of weapons-grade plutonium (with yield) when subjected a 45-MJ fusion yield. According to the notes, the upper radioactivity limit for all experiment types is based upon the figures presented for the Highly enriched uranium experiments.

The table contains a collection of seven sets of data which are only loosely connected and that contain many inconstancies. The fifth through the seventh data set values are based upon a different time frame than the first three data set values. The table requires some formatting to separate the three groups or an effort should be made to break it up into several tables. If the table is to be retained then there needs to be additional footnotes added to provide more details about what each section is supposed to represent. This should include quantitative values for the time frames that they represent. In conclusion, it appears that the data was hastily extracted from other reports and then thrown together without any sort of critical review.

34/26.04 M.5.3.13.1-2 - Radionuclide Materials Management (M-68, PDF page 502 of 643) (3rd paragraph, 2nd half) (referenced to Table M.5.3.13.1-2. on paper page M-73, PDF 507 of 643)

The fourth sentence in the third paragraph states that the table includes tritium gas. This highly radioactive gas is not present in the table. This gas is often

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34/26.04 cont. responsible more radiation than any of the other radionuclides after a short decay period has occurred. Future LLNL SW/SPEISs should include tritium in the table. The environmental impact analysis must take this into account along with all the other radionuclide debris and activation products that result from the proposed experiments. The last sentence states that the tritium gas will be removed by the high-vacuum cryopumps. This refers to trapping the isotope on a cold surface. When refrigeration is lost the gas escapes into the rest of the vacuum system. This process needs to be described and analyzed in a revised draft version of the SW/SPEIS. The current report only mentions liquid nitrogen cooled cryopumps or traps. Typically, such pumps are not considered high vacuum pumps and they are far to warm to trap tritium. A revised draft SW/SPEIS will need to describe how effective trapping of the tritium is to be accomplished.

35/26.03 In Table M.5.3.13-1-2. are lists of the solid target fuels followed, mostly, by two radioactive noble gasses and by volatile radioactive iodine. Except for the solid source materials, the particulates will contain little of the listed isotopes. The vast majority of the radioactivity in the particulates will come from numerous radioisotopes which are missing from this table. I have listed many of them above. A revised SW/SPEIS should provide a full accounting of these isotopes for each of the five experimental conditions listed in the table. Each radioisotope should be followed by three values, its half-life, the radioactivity level in curies, and the mass that that curie level represents in grams. Additionally, the activity level should be specified for a specific time after the first experiment begins.

36/26.03 The section of Table M.5.3.13-1-2. is headed "Inner containment vessel particulates." This appears to be a listing of activation products that are likely to be found in the particulates. No explanation appears that suggest which containment vessel section this might be associated with. This separated list raises the question as to whether these same isotopes might be associated with the main target chamber and what the curie values would be for the accumulated particular particulates that would be found in that space. I noted that many of the listed activation products have fairly short half-lives. If a full set of activation products,

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fission products, source materials and tritium listed under each of the five experimental scenarios then I believe a very different picture would emerge regarding the environmental impacts of NIF operation.

M.5.3.13.1-2 - Radionuclide Materials Management (M-68, PDF page 502 of 643) (4th paragraph, which continues on paper page M-69, PDF page 503 of 643)

The fourth sentence, in paragraph four, reads-

36/26.03 cont. By the time cleaning occurs or components are removed, the radioactive particulate inventory would have decayed to much smaller quantities.

The public needs to ask, are they referring to small subset of the particulate radioisotopes that they have chosen for their short half-lives? Also, how much smaller are they talking about? I believe the term inventory has been distorted to confuse the general public. A revised draft LLNL SW/SPEIS needs to be issued. In its Volume I Glossary the phrase "radioactive particulate inventory" should be defined based upon the way it is used in this EIS.

In closing I must make a few comments on a couple of the other projects in the Proposed Action Alternative.

The Integrated Technology Project in the Plutonium Facility should not be conducted and the equipment should be disassembled under international inspection. It violates the spirit of the Non-proliferation treaty and its safety is overestimated by LLNL insiders who control most of the information on this project. What has been released to the public, in this draft LLNL SW/SPEIS, is a joke, and only happened as a result of potential legal actions. The basic
37/27.01 equipment operated under a different name in the past before funding was dropped. Its past history, including the name and the reasons for the project termination need to be addressed in future versions of this SW/SPEIS. That means all aspects of the history including the portions that LLNL feels is not worth telling. What was presented in this draft SW/SPEIS was an internal pitch for the technology and little else. This served as a cover for the fact that most of the

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37/07.01 background data remains classified so truly independent analysis is impossible.

38/04.03 The plan for the Petawatt Laser Prototype should be put on hold until the public is provided more information on the uses it is funded for and on why the previous petawatt laser was not the prototype. Questions need to be answered as to what the fate of the previous laser was. If it was shipped off to another facility, then why can't it be shipped back to LLNL in order to forgo the construction of a very expensive, new instrument?

LLNL could brighten its future considerably if it could only learn to become far less dependent on the concept that threatening the planet with credible weapons of mass destruction is an essential component for this nation's
39/06.01 survival.

I urge NNSA to choose the Reduced Operation Alternative since it represents a tiny step in the correct direction.

Sincerely,

Vernon Brechin

Vernon Brechin

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